Robert C. Lothrop
By and through the
Bureau of Indian Affairs
c/o CRITFC
729 N.E. Oregon, Suite 200
Portland, Oregon 97232-2107

February 1, 2007

Robert Clapp
Permit Specialist
National Marine Fisheries Service
1201 NE Lloyd Blvd., Suite 1100
Portland, OR 97232-1274
(503) 230-5441 (FAX)
(503) 231-2314

RE: Application for New Section 10 Permit

Dear Mr. Clapp,

Enclosed is an application for a new section 10 permit for scientific purposes to assess adult steelhead status in tributaries of the Imnaha River.

Please do not hesitate to contact me, or the relevant project leaders, if you require additional information or have any questions.

Sincerely,

Robert C. Lothrop
Manager, Public Policy and Litigation
Support Department

A. Title:
Application for Renewal of a Permit for Scientific Purposes under the Endangered Species Act of 1973.

This project will be under the direction of researchers from the Nez Perce Tribe Department of Fisheries Resources Management.

The research project addressed in this application is for monitoring adult steelhead status in tributaries of the Imnaha River.

B. Species: Snake River Basin Steelhead (*Oncorhynchus mykiss*)

C. Date of Permit Application: February 1, 2007.

D. Applicant Identity:

Mr. Robert C. Lothrop
by and through the Bureau of Indian Affairs
c/o Columbia River Inter-Tribal Fish Commission
729 N.E. Oregon Street, Suite 200
Portland, OR 97232
Telephone Number - (503)238-0667

Technical Contact:
Jay Hesse, Director of Biological Services
Nez Perce Tribe Department of Fisheries Resources Management
P.O. Box 365
Lapwai, ID 83540
Telephone Number - (208)843-7145
Fax Number - (208)843-9184
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This application is made by and through the Bureau of Indian Affairs pursuant to P.L. 93-638. This application does not constitute an admission that the Endangered Species Act applies to the activities of the Indian Tribes or Tribal organizations identified in this application.

E. Information on Personnel, Cooperators, and Sponsors:

All personnel who take part in the capturing and handling of listed steelhead will be trained professional or fisheries technicians. Resumes will be on file and available for review. All staff undergo intensive orientation and training in fish collection and handling protocol prior to the conduct of field activities.

Nez Perce Tribe Department of Fisheries Resources Management personnel associated with this research project are as follows:

Principle Investigator
Jay Hesse (208) 843-7145 has BS and MS degrees in Fisheries and Wildlife from Michigan State University. Mr. Hesse has worked for the Nez Perce Tribe Department of Fisheries Resources Management as a Fisheries Research Biologist/Research Coordinator for the past 10years and as the Director of Biological Services for the past two years.

Jason Vogel (208) 843-7145 has BS degree in Fisheries Resources from the University of Idaho and MS degree in Fisheries and Wildlife from Utah State University. Mr. Vogel has worked for the Nez Perce Tribe Department of Fisheries Resources Management as a Fisheries Research Project Leader for the past eight years.

Field Supervisor
Michael Blenden (208) 843-7145 maintains a BS degree in Fisheries Management from the University of Idaho. Mr. Blenden has 14 years professional experience as a Fisheries Research Biologist with the Nez Perce Tribe.

Neal Espinosa (541) 426-5986 has a BS degree in Fisheries and Wildlife Management from Utah State University. Mr. Espinosa has four years of professional experience as a fisheries technician with various agencies and five years professional experience as a fisheries biologist with the Nez Perce Tribe.

Cooperator and Sponsor:

U.S. Fish and Wildlife Service
Lower Snake River Compensation Plan Program Office
1387 Vinnell Way
Boise, ID 83709
(208) 378-5321

Contacts:
Scott Marshall, LSRCP Coordinator
Joe Krakker, Fisheries Biologist

This research activity is conducted by the Nez Perce Tribe as part of monitoring and evaluation program for the Lower Snake River Compensation Plan and is funded by the U.S. Fish and Wildlife Service under Contract Number 14110-6-J014.

F. Project Description, Purpose, and Significance:

1. Justification of Objectives:

Snake River basin steelhead are currently listed as a threatened species under the ESA. Limited information is available on the status (escapement abundance, genetic structure, and life history traits) of steelhead in the Snake River basin, making development of fisheries conservation or management actions problematic. Ideally, baseline information on abundance, spatial structure, and diversity should be assessed in all spawning aggregates.

Specifically related to ongoing fisheries management actions is a lack of data on the dispersion of adult hatchery reared steelhead into streams in the Imnaha River from the Lower Snake River Compensation Plan (LSRCP) steelhead supplementation effort in the Little Sheep Creek drainage. A more comprehensive study of adult steelhead escapement and genetic structure in the entire Imnaha River subbasin is needed. The proposed approach using temporary/portable picket weirs would provide information on adult steelhead escapement (number, timing, spawner age composition, length-age relationships and hatchery/wild composition) and genetic profile in up to ten streams in the Imnaha River subbasin.

2. Relationship to Federal Agency Requirement:

This project indirectly supports the NMFS Biological Opinion(s) on Hydro-systems operations by developing baseline information on population status and interactions of wild and hatchery fish.

3. Broader Significance:

NMFS Biological Opinion(s) (NMFS 2000) states recovery standards will ultimately include measures of abundance, productivity trends, species diversity, and population distribution. Fisheries managers need accurate abundance information on endangered salmon and steelhead to determine current population status and if recovery actions are increasing/recovering wild and natural Snake River salmonid populations. These surveys are conducted under the Lower Snake River Compensation Plan hatchery evaluations program.

The Interior Columbia Basin Technical Recovery Team (ICBTRT) are working on recovery thresholds and delisting criteria for the Columbia River Basin salmon an steelhead stocks (ICBTRT 2005 draft). Their work indicates that available data across the Snake River basin are patchy (ICBTRT 2003). Demographic information is extremely limited, as few spawning ground surveys are conducted due to logistic constraints.

Population information for steelhead in the Snake River could be substantially improved with additional data as stated by ICBTRT (2003). The ICBTRT (2003) identified the following data needs, in order of priority:

Distribution of spawners, particularly in mainstem areas. In order to determine the distance between spawning aggregates, we used spawning areas as identified in Streamnet (2003), modified in a few cases by local data. Real data on the current spatial and temporal distribution of steelhead spawners is sorely lacking, and is fundamental to determining population structure.

Stray rates. Similarly, empirical estimates of stray distances and rates of wild and hatchery fish in natural settings would give us greater confidence in establishing population boundaries and influence of hatchery straying.

Genetic information—broad-scale sampling. Although Moran (unpublished) sampled the Grande Ronde and Imnaha basins extensively, genetic data from the Clearwater and Salmon Rivers and their tributaries have only been collected at a very coarse scale. More fine-scale sampling, consistent with that conducted in northeastern Oregon, would help immensely in refining population delineations.

Genetic information—resident and anadromous fish sampling. Determining the degree to which the resident component of O. mykiss populations contributes to the anadromous component (and vice versa) can provide important insight into population structure and connectivity. In addition, a better characterization of the resident component would allow a more accurate assessment of apparent outlier populations, such as Mud, Prairie, and Dry Creeks in the Grande Ronde basin.

Life-history characteristics. Very little life-history information has been collected that would allow comparison of fish from different streams or basins. Of particular interest is information distinguishing A-run and B-run streams; however, all life-history characteristics, from age structure to juvenile migration patterns, are of interest.

Local area counts and run size. Currently, population or stream-level counts are only conducted for a few streams in northeastern Oregon. Improved information about local run sizes would help substantially in determining whether an area could be considered an independent population.

4. Relationship to Ongoing Work:

This is a continuation of ongoing work in the Imnaha subbasin, specifically on Lightning and Cow creeks facilitated by the Nez Perce Tribe Department of Fisheries Resources Management. This work complements genetic stock structure assessment being conducted under permit 1134 and Oregon Department of Fish and Wildlife scientific research permit.

5. Alternative Approaches:

Alternatives to conducting adult steelhead escapement monitoring include: 1) utilize steelhead escapement counts at Lower Granite Dam to assess wild/hatchery composition of each years run, 2) conducting spawning ground surveys, and 3) a no action alternative. Steelhead management decisions in the Snake River basin based on adult returns have primarily relied on the number of marked and unmarked adult steelhead enumerated at Lower Granite Dam. Return characteristics for individual spawning aggregates are largely unknown. Spawning ground surveys are not physically possible given high turbidity of water conditions during spawning time and the shear amount of potential spawning locations. In addition, redd counts are an index of relative abundance and do not adequately address questions of actual escapement, straying of adults into non-surveyed areas, pre-spawning mortalities and differences in redd counting techniques. None of these alternatives allow for determination of the status of individual spawning aggregates or conservation units of Snake River steelhead.

G. Project Methodology:

Copies of the relevant study plans and statement of work for the Steelhead Escapement Monitoring project are attached (Attachment A).

1. Project Time Period:

Operation of weirs is desired across the entire migration period. Adult steelhead start returning to the Snake Basin in late summer and are present in the Imanha river during the fall and winter, however movement of adult steelhead into spawning tributaries does not occur until spring. Operations of weirs would occur from early January through July 1, or until 10 days after the last adult is captured. The project activities will be conducted annually for at least four years.

2. Procedures and Research Techniques:

Assessment of the total escapement of adult steelhead to the mouth of the Imnaha River with specific data on the metapopulation structure to specific spawning aggregates is desirable. Given the logistical constraints (spring run-off and large number of spawning aggregates) comprehensive monitoring of adult steelhead escapement and genetic stock structure is not feasible because of funding. The use of temporary/portable picket weirs facilitates provides two alternative approaches that can be applied: 1) selective sampling – where key/primary spawning aggregates throughout the subbasin are monitored; or 2) clumped sampling - where all spawning aggregates within a limited area of the subbasin are sampled. Each of these approaches provides critical information for understanding the metapopulation status and dynamics of steelhead in the Imanah River subbasin. Key tributaries in the Imnaha subbasin include: Cow, Lightning, Horse, Big Sheep, Camp, Little Sheep, Freezeout, Grouse, Crazyman, and Gumboot creeks.

Adult escapement (demographic) information and genetic profile information would be collected on three streams of close geographic proximity (Cow, Lightning, and Horse) and similar habitat conditions in the Imnaha River subbasin. It is recommended that systematic sampling of the adult escapement in key metapopulation structure spawning aggregates be continued. Currently, lack of funding prevents initiating this approach or a comprehensive adult escapement monitoring approach. Applying a selective sampling approach that monitors one or two additional key tributaries on a four year rotational basis would help obtain the demographic stock status information. Camp Creek would be the most feasible (stream discharge and proximity to the Little Sheep Creek LSRCP facility) to address and in one additional tributary if funding becomes available.

Hydrology and engineering analysis of stream depth, stream velocity and stream discharge information has been collected during the spring of 1999 and 2000 in six tributaries of the Imnaha River. Based on this analysis, logistical consideration of field staffing (existing crew stationed at Thorn Creek Guard Station and LSRCP Little Sheep Creek adult steelhead collection and acclimation facility), and sampling approaches discussed above,

the Tribal evaluation program will implement the clumped sampling strategy to enumerate adult steelhead spawner escapement in Cow, Lightning, and Horse creeks over the next four year period (2007-2010). Monitoring in two additional streams will be initiated when funding becomes available and activities are coordinated with co-mangers.

Angled upstream and downstream temporary/portable weirs and fish traps will be installed to capture, enumerate and collect data from adult steelhead before release upstream/downstream of the fish counting station. The weirs would be operated from January through July 1, or ten days after the last steelhead is captured. The trap would be checked twice a day for trapped fish and debris maintenance.

Steelhead in the upstream movement box will dipped out with cotton dip net and place into a moist canvas sling/measuring box. Data including fin clips, sex, spawning condition (pre/post), and fork length will be recorded. Scales will be collected from just behind the dorsal fin and above the lateral line using a blunt knife and forceps. A paper hole punch will be used to collect fin tissue from the caudal or dorsal fins for DNA genetic characterization before release upstream of the trap. A double left opercular punch will be given using a paper hole punch and a Tyvek disk tag will be applied to the right operculum. Non-target species will be measured (sub-sample 25/day/species) and released. Steelhead and non-target species will be release into pool/slack water above the weir.

Steelhead captured in the downstream movement box will be examined for opercular punches and Tyvek disk tags. Marked fish will be checked for spawning condition (pre or post-spawn) and released downstream. Downstream moving non-marked steelhead and non-target species will be handled with the same procedures as upstream moving fish with the exception of a downstream release.

We propose to measure stream discharge at established transects on a weekly basis, and more frequently during freshet conditions to establish a discharge and staff gauge relationship. Constant recording thermographs would be installed to describe water temperatures in major tributaries of the Imnaha River subbasin. Adult steelhead spawner migration will be examined in relation to water temperature and stream discharge to describe relation between these variables.

This adult steelhead monitoring project has incorporated the NOAA standards for barrier/trap facilities and NOAA engineering comments concerning water depth and water velocity criteria. The guide fences will be installed at a 30 to 45 degree (upstream) angle to the bank, so as upstream migrating adult salmon encounter the fence they will continue to be oriented upstream and move into the holding area. The holding area will be installed in the channel thalweg, which is anticipated to be the preferred adult steelhead migration corridor. The upstream guide fence is similarly angled to the bank to guide downstream moving adult fish in to a separate holding area. The weir structures include tripod supported upstream and downstream guide fences with downstream and upstream holding areas. Additional weight is placed on the horizontal braces of each tripod into which rock is placed to anchor tripods in place. Picket stringers are constructed of 1/4 inch angle iron with one inch diameter holes punched two inches on center. The fish holding area is

constructed of aluminum angle with dimensions of four feet wide by six feet long. A transition section is located near the holding area to direct fish into the holding area. The guide fence is attached to the counting chamber and transitions with an adjustable wing panel located at each outer corner of the transitions. Installation of the guide fence at any angle between 30 and 45 degrees is possible with the hinged wing panels.

A monitoring and evaluation plan has been developed to provide safeguards against any potential migration impedance. The plan contains criteria for determining when facility impacts are significant to steelhead, guidelines for corrective actions, and a plan implementation schedule. Discrete bank observations will be used to determine if the fish counting station is impeding fish movement. Observation will be made daily after installation of the facility both in downstream and upstream locations. Particular attention will be paid to downstream holding areas. If any problems are identified according to the plan criteria, the pickets or entire counting station will be removed as outlined in the M&E plan.

3. Potential for Injury or Mortality:

Potential does exist for slight delay to upstream migrating fish and/or displacement of spawning adults which will be closely monitored with appropriate monitoring safeguards in place (see Attachment B M&E plan). Potential exists for injury or mortality by jumping with in the holding area and by gilling between pickets. We plan to cover the holding area and provide current breaks within the holding area. Corrective actions will be implemented if jumping injuries occur. The pickets will be spaced one inch apart and gilling of fish is not expected. Fine wire mesh will placed on the downstream pickets with the holding boxes to prevent fish from getting wedged tail first between pickets.

Post-spawned steelhead do not generally die immediately after spawning, but tend to migrate downstream prior to death, repeat spawning of Snake River steelhead is unlikely given mortality of kelts passing through FCRPS projects (NMFS 2000). This life history trait facilitates the recapture of post-spawned fish in the downstream trap. These fish are close to death and the downstream weir will serve as a natural collection area for carcasses and kelts. Low water velocity holding areas will be created in trap boxes. Dead fish associated with the operation of the weir are most likely to be associated with down stream moving post-spawned (kelts) fish. Cause of death will be determined by location of fish captured (ie washed-up on upstream portion of weir, in-stream above or below weir, in trap box, etc).

H. Description and Estimates of Take:

1. List of Species and Populations:

Steelhead (*Oncorhynchus mykiss*) will be monitored during adult return and the reproductive life phase in Imnaha River subbasin (Snake River basin) tributaries, including: Cow, Lightning, Horse, Camp, Gumboot, and Grouse creeks.

2. Specific Dates and Locations of Take:

Sampling of Columbia River/Snake River, Imnaha River steelhead would occur in Cow, Lightning, Horse, Camp, and (Grouse or Gumboot) creeks (Figure 1) from January 1 to July 1 or ten days after the last adult capture. Weir location within each tributary will vary depending on stream structure, land ownership, and access. Ideally, weir locations would be between 0.25 miles and 1.0 from the stream mouth.

3. Description of Status of Stock:

Steelhead are listed as threatened in the Snake River Basin, however steelhead abundance in the Imnaha Basin is largely unknown. The Nez Perce Tribe has conducted specific tributary work on steelhead adult escapement in Lightning and Cow creeks from 2000-2005. Utilizing bi-directional picket weirs and from 2000-2005 the Nez Perce Tribe has quantified escapement with 95% confidence for those two streams (Figure 2). Population estimates for Lightning Creek have ranged from 36 to 232 and 64 to 128 for Cow Creek (Figure 2). Quantification of natural and hatchery origin and sex ratios were also completed (Figures 3 and 4). Limited spawning ground surveys have been conducted by Oregon Department of Fish and Wildlife in Big Sheep and Camp creeks in the ImnahaRiver Subbasin.

4&5&6. Description/calculation of Estimated Take

Capture of adult steelhead will be primarily wild (unmarked) fish, with a smaller portion of hatchery (fin clipped or CWT'ed) fish (see figure 3 for previous take proportions). All steelhead captured will be marked (tagged) with an opercular punch and Tyvek opercular disk tag. In addition to original capture, a portion of the upstream moving fish will be recaptured as downstream moving post-spawn (kelts). Table 1 is a summary of the take numbers and direct and indirect mortality for Lightning Creek for 2000-2005 and Table 2 for Cow Creek 2001-2005. Indirect mortalities include all kelts/post-spawn fish that are found in the stream or washed up onto the weir as carcasses, in addition to postspawn carcasses that are in the downstream trap box. Direct mortalities are fish that are killed as a direct result of the weir structure (impinged in pickets, etc.) or direct handling (Table 1 & 2).

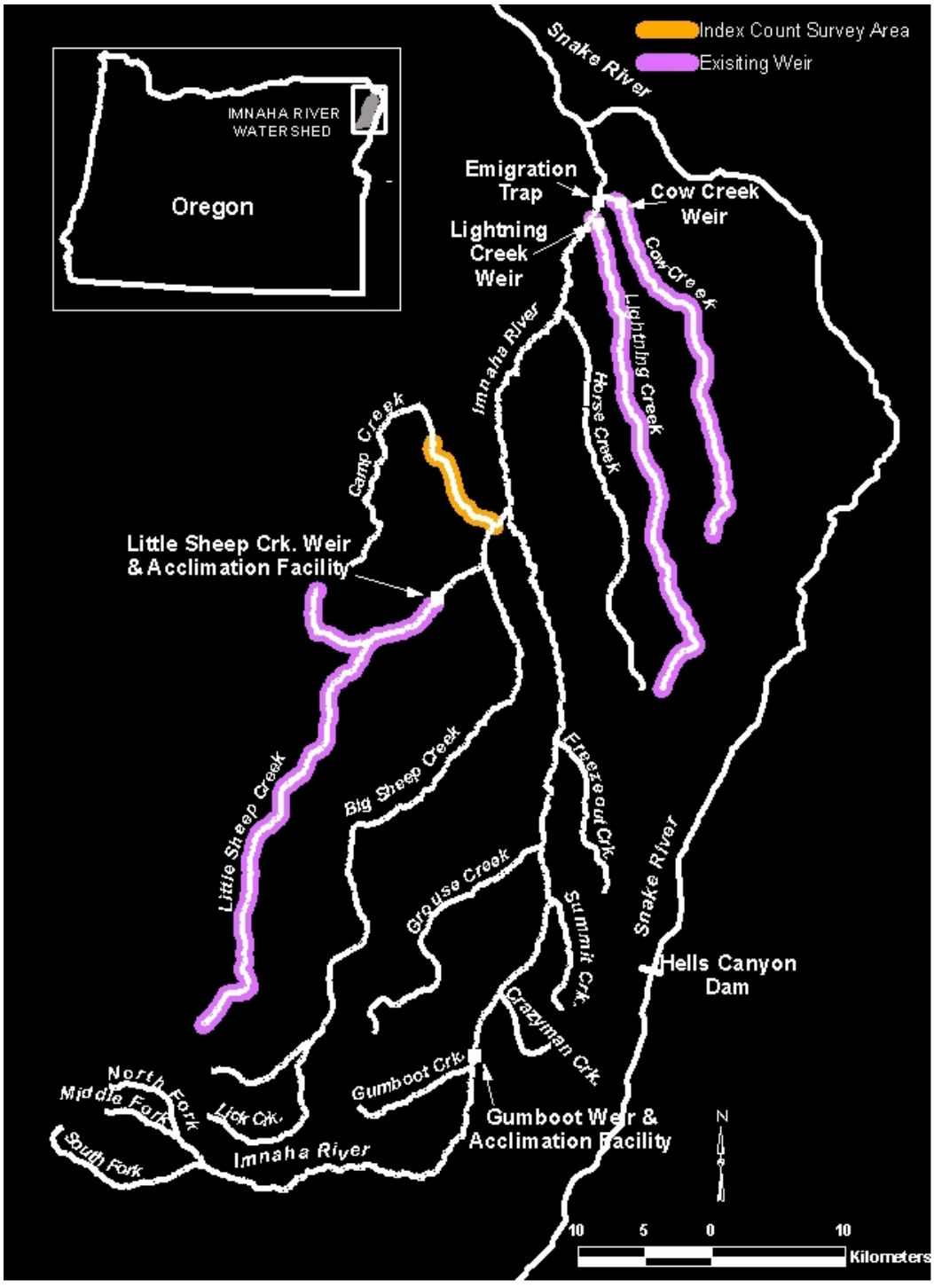

Figure 1. Location of study area with reference to existing adult steelhead weirs in Lightning and Cow Creeks.

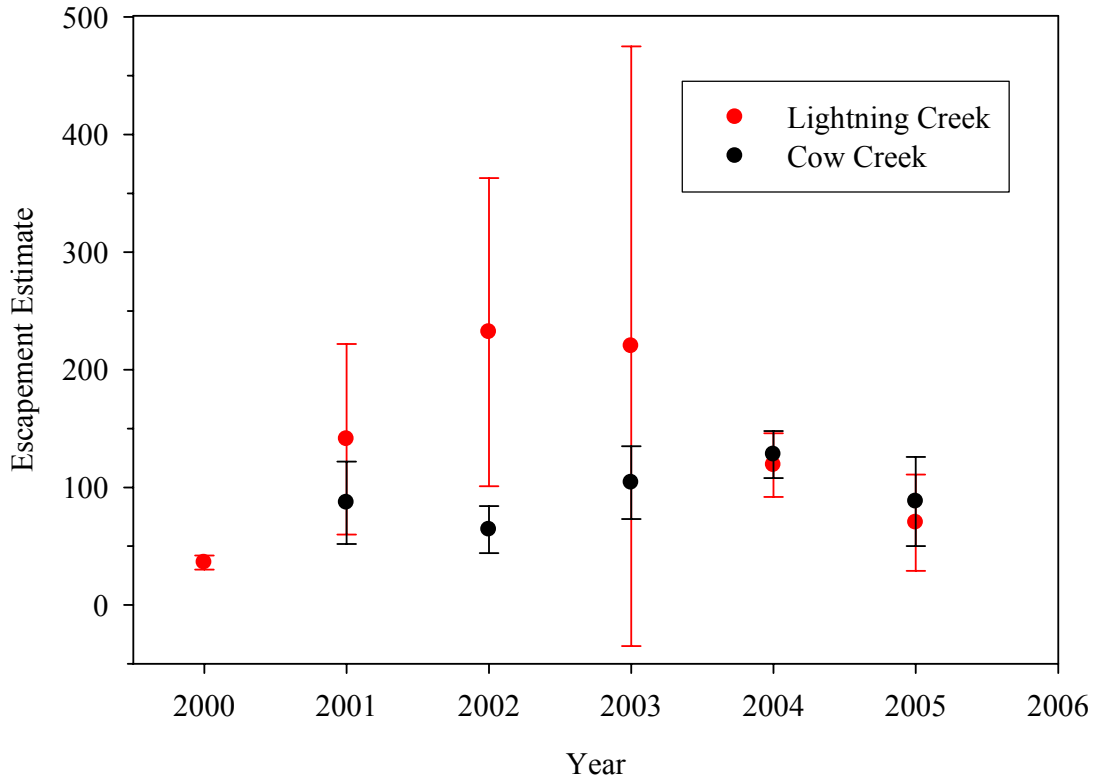

Figure 2. Adult abundance estimates for Lightning and Cow Creeks from 2000-2005 with 95% confidence intervals. Estimates calculated utilizing mark-recaptures methods.

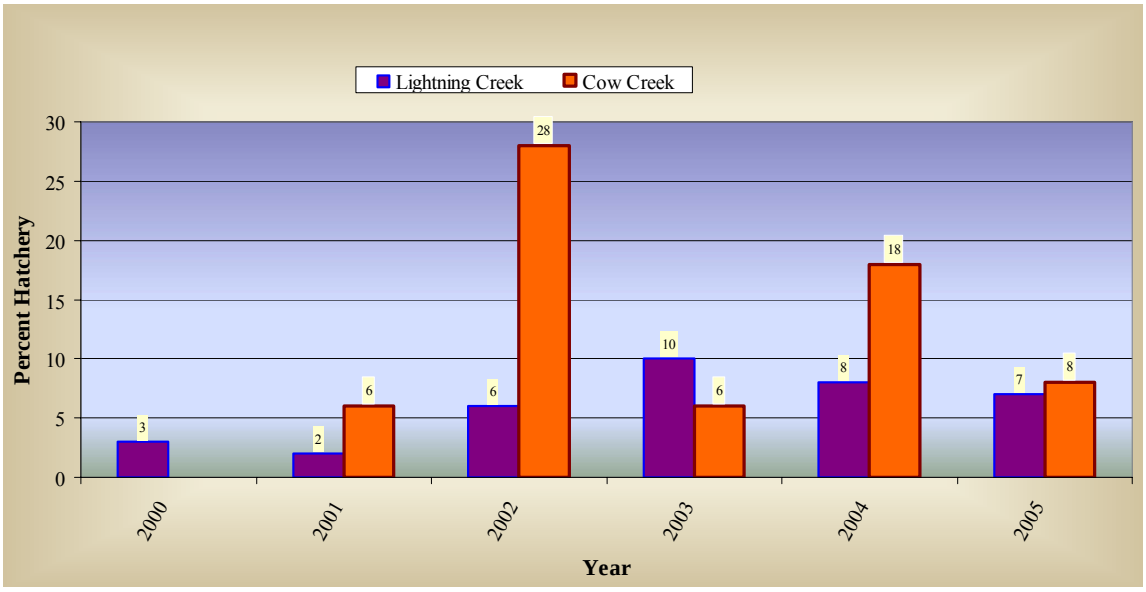

Figure 3. Origin (percent hatchery) of adult steelhead captured in Lightning and Cow Creeks from 2000-2005.

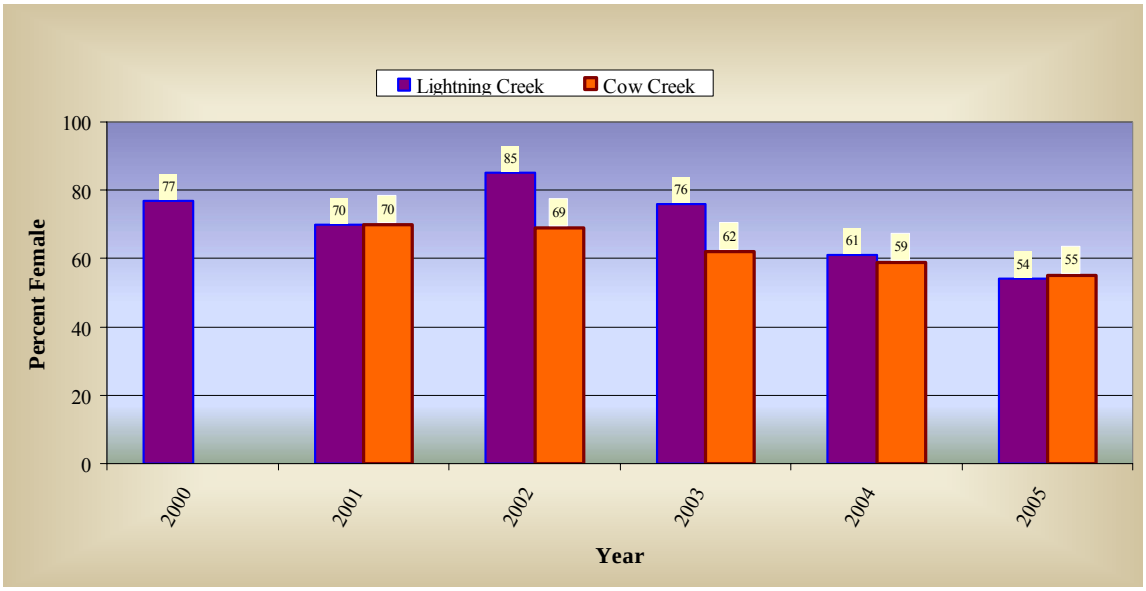

Figure 4. Proportion of females to the total catch for Lightning and Cow creeks for 2000-2005.

Table 1. Adult steelhead handled in Lightning Creek for 2000 through 2005. Also listed is the indirect mortality (number of carcasses/kelts) and direct mortality (weir impingement and handling).

Year	Total Captures*	Total Indirect Mortalities (carcasses/kelts – post spawn)	Total Direct Mortality (weir impingement, handling)
2000	56	9	1
2001	104	12	0
2002	147	70	1
2003	79	16	1
2004	142	16	3
2005	71	2	1
Totals	599	125	7

* Fish recaptured in the downstream direction are added into the total captures

Table 2. Adult steelhead handled in Cow Creek for 2001 through 2005. Also listed is the indirect mortality (number of carcasses/kelts) and direct mortality (weir impingement and handling).

Year	Total Captures*	Total Indirect Mortalities (carcasses/kelts – post spawn)	Total Direct Mortality (weir impingement, handling)
2001	90	8	1
2002	81	15	1
2003	118	14	1
2004	150	8	0
2005	106	7	0
Totals	545	52	3

* Fish recaptured in the downstream direction are added into the total captures

Utilizing the take data from Lightning and Cow creeks from 2000 – 2005 we estimated the take for the new permit period for Lightning, Cow, horse, and Camp creeks (Table 3). Funding alternatives are uncertain for the future and so we listed and optional stream section to incorporate other alternatives (Grouse and Gumboot creeks are most likely alternatives).

Table 3. Estimated take, indirect, and direct mortality of steelhead at Lightning, Horse, Cow, Camp, and optional stream.

Stream	Estimated Number of Live Adults Captured and Tagged, released	Estimated Total Indirect Mortalities (carcasses/kelts – post spawn)	Estimated Total Direct Mortality (weir impingement, handling)
Lightning Creek	175	75	5
Horse Creek	175	75	5
Cow Creek	175	75	5
Camp Creek	175	75	5
Optional Stream*	175	75	5
Totals	875	375	25

*Selection of specific stream dependent on level of funding and logistical constraints of sampling. Grouse or Gumboot creeks are most likely alternatives.

The steelhead monitoring project utilizes upstream and downstream guide fences supported by tripods, with a fish holding area. Adults will be held in four feet by six feet holding areas. The weirs will have both upstream and downstream traps. Specific description of the fish counting station is in Section V A. Design of the fish counting station was conducted by River Master's Engineering of Pullman, Washington.

Steelhead carcasses/kelts are sampled by hand and biological information taken on data sheets, scales taken in labeled scale envelopes, CWT snouts taken in double labeled plastic bags, genetic tissue samples from opercle punches stored in 95% ethanol. CWT hand wands are used to identify fin clipped adult salmon that actually have a CWT in the snout. Hand held PIT TAG scanners will also be used to check for the presence of tags.

I. Transportation and Holding:

1. Transportation of a Listed Species

a. **Mode of Transportation:** Not applicable
b. **Length of Time in Transit From Capture Site:** Not applicable.
c. **Length of Time in Transit For Any Future Moves:** Not applicable.
d. **Qualifications of Common Carrier Used For Transportation:** Not applicable.
e. **Description of Containers Used to Hold Captured Fish:** Captured adult steelhead will be momentarily held in a fish measuring sling during biological sampling.

J. Special Care Before and During Transportation:

Not applicable.

2. Holding of a Listed Species:

a. **Trap box dimensions:** Weirs will be four feet by six feet and located in the deepest water available.

b. **Water Supply and Amount:** Not applicable
c. **Diet For All Animals:** Fish will not be fed during their holding.
d. **Sanitation Practices:** Biological sampling gear will be sterilized with ethanol in between fish.

3. Emergency Contingencies:

Not applicable

K. Cooperative Breeding Program:

Not applicable.

L. Previous or Concurrent Activities Involving Listed Species:

1. Identification of Previous Permits:

Section 10 Permit 825 (expired chinook salmon permit)
Section 10 Permit 1134 (current chinook salmon permit)

2. List of All Listed Species Taken since Salmon were Listed Under ESA:

Not applicable.

M. Certification:

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 and regulations promulgated thereunder, and that false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA".

_____

Robert C. Lothrop Date

Mr. Robert C. Lothrop
By and through the Bureau of Indian Affairs
c/o Columbia River Inter-Tribal Fish Commission
729 N.E. Oregon Street, Suite 200
Portland, OR 97232

References

ICBTRT (Interior Columbia Basin Technical Recovery Team) 2003. Independent populations of chinook, steelhead and sockeye for listed evolutionarily significant units (ESUs) within the interior Columbia basin. (http://www.nwfsc.noaa.gov/trt/trt_pop_id.htm).

ICBTRT (Interior Columbia Basin Technical Recovery team) 2005 draft. Interior Colubia Basin TRT: Viability criteria for application to interior Columbia Basin salmonid ESUs. (http://www.nwfsc.noaa.gov/trt/trt_viability.cfm).

National Marine Fisheries Service (NMFS). 2000. Endangered Species Act – Section 7 Consultation - Biological Opinion: Re-initiation of consultation on operation of the Federal Columbia River Power System, including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation projects in the Columbia Basin. National Marine Fisheries Service, Northwest Region. December 2000.

ATTACHMENT A

MONITORING AND EVALUATION STUDY PLAN

Lower Snake River Compensation Plan
Nez Perce Tribe Hatchery Evaluation Studies

Fiscal Year 2006

by

Jason L. Vogel
Jay A. Hesse

Nez Perce Tribe
Department of Fisheries Resources Management
P.O. Box 365
Lapwai, ID 83540

May 2005

INTRODUCTION

The Lower Snake River Compensation Plan (LSRCP) was conceived in 1976 to mitigate for steelhead and spring, summer and fall chinook salmon losses to streams in the Snake River basin due to construction of the Lower Snake River hydro-power facilities. In 1985 the Nez Perce Tribe became involved in the program. The Nez Perce have historically managed and fished throughout the Snake River basin.

The Nez Perce Tribe's long range goals for the LSRCP are:

1. To reestablish and/or enhance production in all anadromous fish streams within the reservation, in the ceded area of the Nez Perce and throughout the Snake River Drainage, where feasible;

2. To reestablish and/or establish tribal fisheries when and where opportunities exist and to assist in establishing sport fisheries;

3. To monitor LSRCP hatchery facilities in an effort to maintain a quality production program which will meet LSRCP goals; and,

4. To demonstrate at what point in time the LSRCP meets the identified adult return mitigation goals.

The LSRCP program presently supports 11 hatchery programs in three states. This program is one approach to attempt to preserve and recover anadromous fish populations in the Snake River basin.

Discussion of Major Goals

1. **To reestablish and/or enhance production in all anadromous fish streams within the reservation, in the ceded area of the Nez Perce and throughout the Snake River Drainage, where feasible.**

The Nez Perce culture and society is closely linked to anadromous fish. Historically the Nez Perce migrated with respect to and timing of anadromous fish runs. As the prime long range goal, the Tribe would like to reestablish and/or enhance anadromous salmonid production in all anadromous fish streams within the reservation, ceded territory (here after referred to as the ceded territory; Figure 1) and throughout the Snake River drainage, where feasible. As stated by the Nez Perce Executive Committee in resolution (86-38), the Nez Perce Tribe has interests in restoring the historical population of salmon and steelhead in the Snake River basin. The Tribe recognizes the "benefits and costs of enhancing salmon and steelhead throughout the aboriginal territory and in usual and accustomed areas."

The LSRCP requires the restoration and/or enhancement of fish populations within the Snake River drainage. Enhancement is important to the Tribe because many of these populations were

located in usual and accustomed fishing areas and would enhance natural production of native salmon populations and allow for additional harvest opportunities within the ceded territory.

It is recognized that restoration of fish populations to historic numbers is probably not feasible under present conditions, in all areas. The Hell's Canyon Dams have eliminated sockeye salmon, chinook salmon and steelhead production in the upper Snake River Drainage. Dworshak Dam has also eliminated anadromous fish production in the North Fork of the Clearwater River. Coho salmon and sockeye salmon are extinct in other drainages of the Snake River system.

2. **The Tribes second major goal is to reestablish and/or establish tribal fisheries when and where opportunities exist and to assist in establishing sport fisheries.**

The Tribe's major emphasis under this objective is to reestablish tribal fisheries within the ceded territory and in usual and accustomed sites as fish populations allow. As a co-manager of the fisheries resource with the states of Oregon, Washington and Idaho, the Tribe also must participate with the individual states on a technical and policy level, in the establishment of sport fisheries. Through joint development of tribal and sport fisheries at the technical and policy levels major conflicts can be avoided and fishery management enhanced.

3. **Monitor LSRCP hatchery facilities in an effort to maintain a quality production program, which will meet LSRCP goals.**

The Tribe's third major goal for the LSRCP is to monitor the program's hatchery facilities in an effort to maintain a quality production program. This monitoring would be done jointly with the hatchery management agencies to avoid unnecessary duplication of effort. The monitoring will deal with on and off-site production of LSRCP fish.

4. **To demonstrate at what point in time the LSRCP meets its mitigation goals.**

The Tribe's fourth long term goal is to demonstrate at what point in time the LSRCP meets its adult return goal, in terms of rebuilding natural runs and of returning hatchery runs. Many production plans never give full production deadline dates. In response to LSRCP production the Tribe has identified two to three brood cycles, after LSRCP facilities are online, or the year 2000, as the desired adult mitigation performance evaluation. This is the time frame in which most facilities should see LSRCP identified adult returns met. At this point we will determine the program performance in terms of adult mitigation return goals and; if not, identify additional steps to meet them. As part of this objective individual facilities will be reviewed for their contribution to meeting the LSRCP goals.

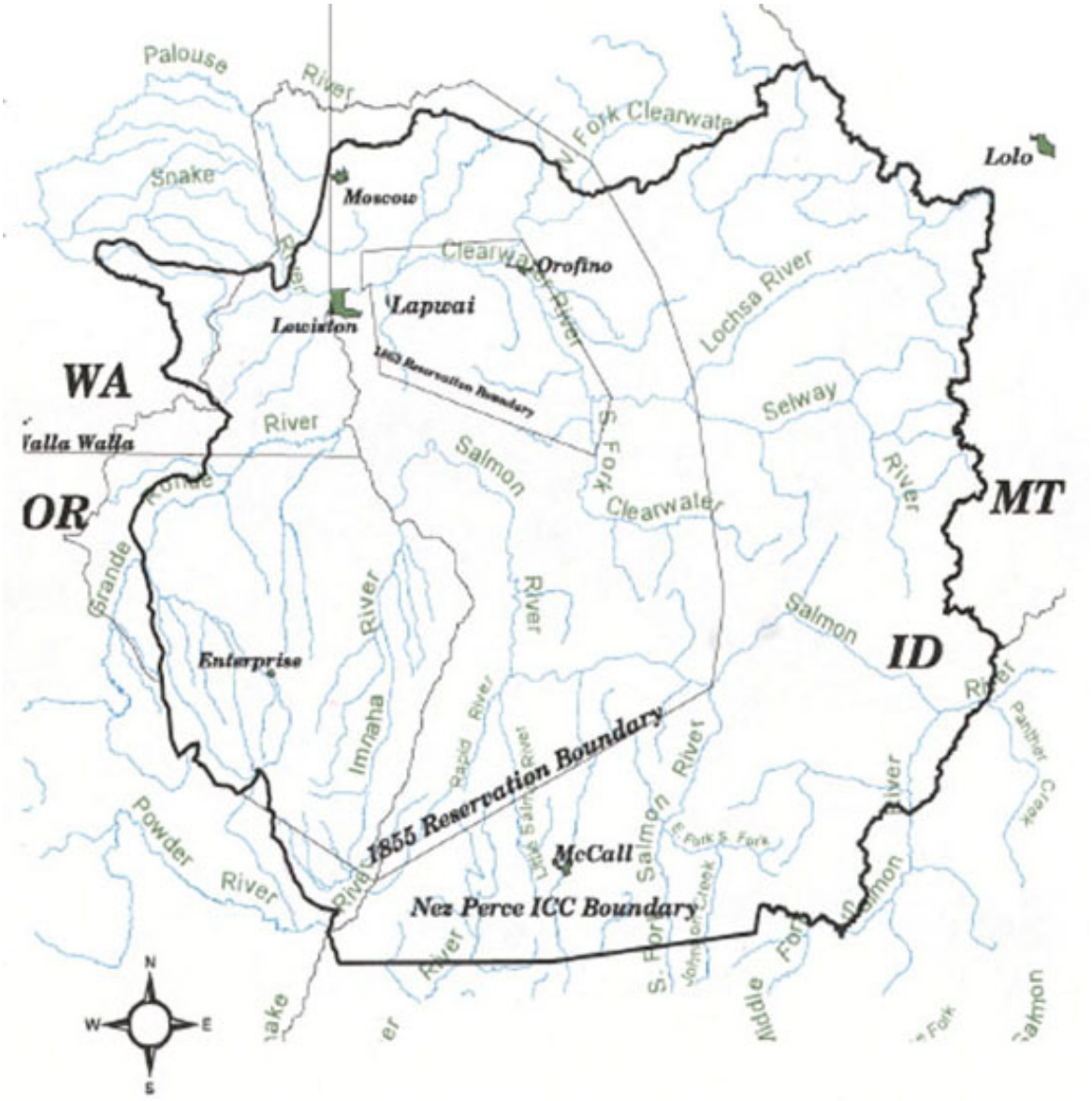

Figure 1. Ceded area (1855 treaty) and present (1863 treaty) boundary of the Nez Perce Indian Tribe Reservation.

2005-2006 EVALUATION STUDY PLAN

1. Objectives

A. General

The Nez Perce Tribe Department of Fisheries Resources Management will coordinate LSRCP hatchery production planning, the Tribal evaluations program (including tribal harvest) and provide information and recommendations for the Nez Perce Tribe Executive Committee (NPTEC). Evaluation personnel will also attend coordination meetings, marking and tagging meetings with the states of Idaho, Oregon, and Washington and with the U.S. Fish and Wildlife Service. The Tribal LSRCP monitoring and evaluation project leader will attend all pertinent LSRCP meetings and participate in evaluation activities at various LSRCP facilities in Idaho, Oregon and Washington. Work schedules will be coordinated with tribes, states and federal agencies to maximize cooperation in monitored streams in the Clearwater, Salmon, Grande Ronde and Imnaha River subbasins in order to establish baseline data for determining the relative success and effect of supplementing streams with hatchery-reared fish.

The initial goal of the LSRCP program was mitigation and compensation for loss of fisheries resources resulting from the construction and operation of the four lower Snake River dams. More recently, since the listing of multiple Snake River fish species under the Endangered Species Act (ESA), the LSRCP program has transitioned focus to conservation and preservation of chinook salmon and steelhead in the Snake River basin. As such, several key parameters should be monitored to determine status of fish populations and evaluate the effectiveness/impacts of management actions. These parameters are abundance, growth rate, spatial structure, and diversity (McElhany et al. 2000). The focus of conservation and recovery programs is naturally reproducing populations. Operation of the LSCRP program in a conservation context requires the program to expand its focus beyond the performance of the hatchery product and to include assessment of the status of naturally produced population segments as well as evaluating the contribution of hatchery produced fish towards increasing natural production. Ideally, monitoring of these parameters would occur across all spawning aggregates within the Snake River basin. The Northwest Power Planning Council's Artificial Production Review (NPPC 1999) recommends a comprehensive set of performance measures that should be monitored in all artificial propagation programs and will be used to guide independent reviews of artificial propagation programs.

The Tribal LSRCP evaluations program is structured to monitor aspects of LSRCP hatchery production performance, natural production status and performance, promote genetic conservation, and to contribute to the co-management of the LSRCP program. Monitoring of the performance of hatchery production involves pre-release sampling, marking, estimating post-release survival, and estimating the percentage of LSRCP adult hatchery fish contributing to spawning below broodstock collection weirs. Adult escapement of both natural and hatchery origin chinook salmon and steelhead in several key spawning aggregates, pre-release sampling of LSRCP hatchery produced fish, monitoring of life stage survival of naturally and hatchery produced fish, and identification of the genetic stock structure are monitored. This includes the

investigation of downstream emigrating salmon and steelhead in the Imnaha River to document chinook salmon and steelhead emigration timing through the Imnaha River and emigration timing, travel time and survival estimation to Snake River dams. Juvenile survival estimation will be estimated using the SURPH.2 model. If sufficient numbers of smolts are PIT tagged as presmolts and/or smolts tributary specific smolt-to-adult survival will be estimated for Imnaha River natural-origin chinook salmon. Coordination of chinook salmon and steelhead cryopreservation activities will continue at LSRCP hatchery facilities and in tributary streams in an effort to develop and maintain a germplasm repository for adult male salmon and steelhead gametes.

B. Specific

OBJECTIVE 1. Coordinate LSRCP hatchery production planning, evaluations program, harvest monitoring, and management recommendations for the Nez Perce Tribe.

OBJECTIVE 2. Coordinate Nez Perce Tribe evaluation studies with the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

OBJECTIVE 3. Conduct Nez Perce Tribe studies and participate in ongoing LSRCP evaluation studies.

OBJECTIVE 4. Determine the emigration timing of natural and hatchery reared chinook salmon smolts in the Imnaha River and estimate the post-release survival of hatchery reared chinook salmon smolts in the Imnaha River.

OBJECTIVE 5. Determine and compare the migration timing, travel time, emigration survival, and smolt-to-adult survival of natural and hatchery reared chinook salmon and steelhead from the Imnaha River through the Snake River to Lower Granite Dam and to McNary Dam.

OBJECTIVE 6. Determine adult steelhead abundance and spatial structure in the Imnaha River subbasin.

II. Tasks

The NPTEC shall furnish all supervision, labor, services, materials, tools, and equipment necessary to conduct an evaluation of LSRCP hatchery operations and related fishery management of tribal ceded and reservation lands in the Snake River basin of Northeast Oregon, Washington, and Idaho, as follows:

OBJECTIVE 1. Coordinate LSRCP hatchery production planning, evaluations program, harvest monitoring, and management recommendations for the Nez Perce Tribe.

Approach:

To ensure full Tribal participation in the LSRCP program, the Nez Perce Tribe will participate in all appropriate LSRCP production planning, marking and tagging, stocking and coordination meetings. The LSRCP program office has placed more emphasis on reevaluating the LSRCP program's evaluations study guidelines. Additional staff time is anticipated in refinement of these guidelines through participation in core and technical team efforts with comanagers. Tribal staff will also coordinate with state and federal agency personnel concerning current and proposed evaluation studies to ensure complete coordination, management consistency and to avoid duplication of effort.

Task 1.1. - Participate in production planning, annual operations planning, marking and tagging, stocking, core and technical team evaluation study guideline, and coordination meetings for all LSRCP hatchery facilities in Idaho, Oregon and Washington with state and federal agencies.

Task 1.2. - Develop and provide annual operational plans for Nez Perce Tribe LSRCP hatchery evaluations.

Task 1.3 – Coordinate LSRCP hatchery evaluation efforts with regional research, monitoring, and evaluation study design and data distribution/reporting.

Task 1.3. - Provide information and management recommendations to Nez Perce Tribe Executive Committee for planning and operation of LSRCP hatchery facilities.

OBJECTIVE 2. Coordinate Nez Perce Tribe evaluation studies with the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Approach:

The Nez Perce Tribe does not recognize that the Endangered Species Act takes precedence over or precludes Tribal sovereignty or rights in any manner. However, the Tribe does

recognize that Chinook salmon, steelhead and bull trout are listed as threatened species under the Endangered Species Act, and strongly believes in coordination efforts to conserve, protect and recover populations at low levels of abundance and high risk of extirpation. In that regard the Columbia River Inter-Tribal Fish Commission maintains Section 10 permits, by and through the Bureau of Indian Affairs, coordinating tribal activities relative to listed salmon and trout populations. The following activities are thus undertaken to coordinate with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act.

Task 2.1. - Provide technical assistance describing Nez Perce Tribe LSRCP evaluation studies for Section 10 permits.

Task 2.2. - Provide updated evaluation activities to modify Section 10 permits as necessary.

Task 2.3. - Provide annual reports to NMFS and the USFWS which summarize project activities relating to listed chinook salmon, steelhead and bull trout subpopulations under the Endangered Species Act.

Task 2.4. – Attended Endangered Species Act permitting workshops and artificial propagation biological opinion meetings.

OBJECTIVE 3. Conduct Nez Perce Tribe studies and participate in ongoing LSRCP evaluation studies.

Subobjective 3.1 Assess adult Chinook salmon abundance and monitor trends in population status.

Approach:

Enumeration of adult salmon escapement is a critical status metric (McElhany et al. 2000). Expanded redd counts do not provide an accurate or precise estimate of salmon abundance (Beamesderfer et al. 1998, Dunham et al. 2001, Faurot and Kucera 2001, 2003). Direct or census enumeration of adult escapement by physical or remote counts is ideally desired. In cases where this is not possible either physically or financially, redd counts provide an index of relative abundance, provide trend information, spawner distribution data, and estimating the percentage of LSRCP adult hatchery fish contributing to spawning below broodstock collection weirs. Biological information from salmon carcasses allow age determination and sex composition of the spawning population. Analyzing age structure for complete brood years of spawning adults allows a measure of productivity, adult spawner to spawner ratios, of the subpopulation on a temporal basis.

All McCall Hatchery chinook salmon have been marked (fin clipped or CWT) since brood year 1991 allowing for the direct determination of origin. Chinook salmon spawning ground surveys will be conducted from late July to mid-September 2005 to assess the relative success of the McCall Hatchery chinook salmon hatchery program, for recovery of coded-wire tagged fish, and to assess the trend in redd numbers of wild spawning chinook salmon in Big Creek. Spawning ground surveys in the South Fork Salmon River (SFSR) will occur below the adult weir to determine the status and composition of natural:hatchery adult salmon reproducing in the wild. Four selected stream reaches will be walked at least four times and redds enumerated, live fish counted, and biological information collected from carcasses. The stream reaches include: the adult weir to Dime Creek (5.1 km), Dime Creek to the unnamed tributary downstream of Mirror Creek (5.6 km), Poverty Flat (1.1 km), and Lodgepole Campground to Phoebe Creek (6.1 km). Biological information collected from salmon carcasses will include measuring fork length and mid-eye hypural length, internal examination for sex and percent spawned, examination for marks, tags and fin clips, removal of snouts from coded-wire-tagged fish, and taking of scales or fin rays for age and growth analysis and age structure determination. Information from salmon carcass recovery in Johnson Creek, Secesh River and Lake Creek, will be examined to determine dispersion of McCall Hatchery reared adults in other South Fork Salmon River tributaries.

Task 3.1.1. - Conduct multiple ground count chinook salmon spawning ground surveys in Idaho on the South Fork Salmon River (below the adult weir) and in upper Big Creek (Middle Fork Salmon River) in the Salmon River system.

Task 3.1.2. - Collect biological information (length, scales, fin rays, percent spawned, marks/tags, snouts) from all adult chinook salmon carcasses encountered on the South Fork Salmon River downstream of the adult weir and in Big Creek.

Task 3.1.3. - Randomly collect tissue for DNA genetic analysis of 60 adult carcasses each from: Poverty Flat, adult weir to unnamed tributary upstream of Mirror Creek, McCall Hatchery broodstock, Stolle Meadows, Johnson Creek, and the Secesh River to support baseline sample archiving within the SFSR subbasin.

Task 3.1.4. - Determine hatchery:natural adult composition on the spawning grounds in the South Fork Salmon River, below the adult weir, using known hatchery adipose and ventral fin marked adults.

Task 3.1.5. - Calculate age structure and sex composition of the spawning population for application in determining adult spawner to spawner ratios by brood year.

Task 3.1.6. - Coordinate spawning ground survey information with other ongoing projects in the South Fork Salmon River to examine dispersion of McCall Hatchery reared chinook into other tributary streams.

Task 3.1.7. - Prepare reports summarizing adult salmon spawning ground surveys.

Task 3.1.8. – Provide South Fork Salmon River adult salmon escapement study design and proposal to Lower Snake River Compensation Plan Monitoring and Evaluation Guidelines for review.

Subobjective 3.2. Assist IDFG, USFWS and ODFW with ongoing LSRCP evaluation studies to achieve Nez Perce Tribe participation in the LSRCP program.

Approach:

To achieve more tribal participation in the LSRCP program and foster positive interactions between comanager staff, the Nez Perce Tribe will work with the respective federal and state agency personnel at LSRCP hatchery facilities and with field activities. Assistance as needed will be given to the USFWS at DNFH in pre-release sampling of juvenile chinook salmon. Assistance will be provided in the PIT tagging of hatchery reared chinook salmon and steelhead trout as needed at DNFH, Kooskia Fish Hatchery and Lookingglass Fish Hatchery (LFH). Staff will participate in spawning ground surveys.

Task 3.2.1. - Assist ODFW in chinook spawning ground surveys in Oregon on the Imnaha River, Big Sheep Creek and Lick Creek to evaluate the LSRCP stocking program, and in the Lostine River, Minam River, and Wenaha River. Snouts from coded-wire-tagged chinook carcasses will be provided to ODFW for wire tag interrogation.

Task 3.2.2. – Conduct multiple pass spawning ground surveys in Lick Creek to cover entire spawning period, specifically addressing contribution of adult outplants to redd construction.

Task 3.2.3. - Coordinate and assist with marking efficiency evaluation for production release chinook salmon at McCall Hatchery and Lookingglass Fish Hatchery.

Task 3.2.4. - Coordinate and assist ODFW in PIT tagging of Imnaha River juvenile chinook salmon in Lookingglass Fish Hatchery and collection of biological information on Imnaha River juvenile chinook salmon and Little Sheep Creek steelhead prior to release and adult returns to Oregon facilities if needed.

Subobjective 3.3. Coordinate, collect and cryopreserve adult male chinook salmon and steelhead gametes from LSRCP hatcheries and from selected Snake River tributary streams.

General:

Genetic conservation through population protection and monitoring has not proven successful in the Snake River basin as all Pacific salmon and steelhead are listed as threatened under the Endangered Species Act (Kucera and Blenden 1999). Gamete

preservation seeks to apply cryogenic technology to preserve male germ plasm from chinook salmon and steelhead conservation units that are at low levels of abundance and high risk of extirpation. The goals of genetic conservation are to reduce the possibility of extinction and ensure recovery of a species as a functioning ecological unit of the environment. Sustained productivity of salmonids in the Pacific Northwest is possible only if the genetic resources that are the basis of such productivity are maintained (National Research Council 1996). Gene conservation preserves further loss of genetic diversity and can preserve long term evolutionary potential. Implementation of cryogenic techniques has been shown to be an appropriate approach to the large scale genome banking of gametes. Therefore, germplasm repositories can play a crucial role in the management of threatened and endangered species. Preservation of genetic material provides options for future conservation actions by providing an opportunity for rebuilding stocks or maintaining genetic diversity caused by population bottlenecks (Ryder et al. 2000). Although preservation of the maternal nuclear DNA component has been accomplished with some mammals (Rall and Fahy 1985, Fahning and Garcia 1992, Dobrinsky et al. 1991, Ali and Shelton 1993, Kono et al. 1988, Hayashi et al. 1989) it has not been accomplished with fish. Successful development of methods to preserve female gametes is an active area of research and would greatly increase the ability to recover threatened salmonid stocks. This approach seeks to preserve and maintain genetic diversity for ongoing artificial propagation programs, conventional and captive broodstock, and to preserve genetic diversity from selected wild populations as an insurance policy against population collapse and extirpation (Kucera 1999, Faurot et al. 1998, Armstrong and Kucera 1999, 2000, 2001).

Approach:

Chinook salmon gene conservation measures were initiated in 1992, and steelhead in 1997 through cryopreservation of adult male gametes (semen). Collections from LSRCP hatcheries was initiated in 1996. Nez Perce Tribe staff will coordinate collection of samples from LSRCP chinook salmon hatchery facilities in the Imnaha River (Lookingglass Hatchery), at the South Fork Salmon River (McCall Hatchery), and at Sawtooth Hatchery. We will also coordinate collection of samples from the LSRCP steelhead facility at Little Sheep Creek. Samples from Lookingglass Fish Hatchery, Little Sheep Creek, and the Oxbow trap will be collected by our hatchery evaluations staff. We will also assist with field collections of wild and natural salmon from tributaries in the Snake River basin in an effort to establish a germ plasm repository for Pacific salmon. A portion of all samples (≥50%) will be archived for long term storage and conservation purposes (Armstrong and Kucera 2000).

Nez Perce Tribe staff will assist with transport of cryopreserved semen and fertilization of Lostine River captive broodstock females during spawning at Bonneville Hatchery. The captive broodstock plan identifies use of cryopreserved semen to maintain genetic diversity in the artificially propagated captive brood population. Semen collected and preserved from naturally spawning adult male chinook salmon in the Lostine River since 1994 will be provided upon request.

Nez Perce Tribe staff will assist in the development and implementation of fertilization procedures for cryopreserved samples. This effort will involve coordination of current sample use and further definition of expected results through small-scale fertilization experiments. The purpose of fertilization experiments is to provide fisheries managers information relative to fertilization rates that can be expected for chinook salmon when using cryopreserved semen. The goals of fertilization experiments are to: 1) document fertilization rates of spring chinook salmon eggs using fresh semen and cryopreserved semen, and 2) document fertilization rates of cryopreserved semen that is in the germ plasm repository.

The Tribal LSRCP hatchery evaluations program initiated cryopreservation efforts on chinook salmon in the Snake River basin in 1992. However, a Bonneville Power Administration Tribally funded project was initiated in 1997 specifically designed for larger scale preservation of adult male salmon and steelhead gametes. This project maintains the funding resources to carry out the majority of the sample collections and preservation at the University of Idaho and Washington State University. LSRCP hatchery evaluations personnel will continue to coordinate and assist with sample collections at LSRCP hatchery facilities. Young and Kucera (2003) have identified that a relatively large number of cryopreserved chinook salmon male gametes exist from LSRCP hatchery facilities. Collections in 2005 will focus on effective brood years that are underrepresented in the repository, and on wild/natural males. We will also assist in field collections as substantial numbers of staff are required to successfully collect spawned-out adult male salmon in tributary streams.

Task 3.3.1. - Collect 100 Imnaha River (Lookingglass Hatchery) adult male chinook salmon gamete samples, 20-25 per week, over a four to five week period for cryopreservation.

Task 3.3.2. - Coordinate and assist in collection of 100 adult male chinook salmon gamete samples, 20-25 per week, over a four to five week period from LSRCP hatchery facilities at the South Fork Salmon River adult weir and at Sawtooth Hatchery for cryopreservation.

Task 3.3.3. - Assist in field collection of 30 post-spawned adult male chinook salmon from Big Creek, Marsh Creek, Capehorn Creek, Johnson Creek, Lake Creek, South Fork Salmon River, Minam River, Wenaha River, Lostine River for cryopreservation of male gametes.

Task 3.3.4. - Collect 100 adult male steelhead gamete samples, 15-25 per week over a 4-6 week period from the Little Sheep Creek LSRCP facility.

Task 3.3.5. – Assist with fertilization trial experiments to determine post thaw fertility of cryopreserved male gametes.

Task 3.3.6. - Participate in an effort to develop a Snake River basin-wide plan to gene bank listed Snake River male chinook salmon and steelhead gametes.

Task 3.3.7. - Coordinate the near term utilization of cryopreserved gametes in all LSRCP hatchery facilities as needs arise (i.e. lack of ripe males in low escapement years).

Task 3.3.8. - Assist in fertilization of Lostine River chinook salmon captive broodstock females at Bonneville Hatchery with cryopreserved semen.

Task 3.3.9. - Report on results of chinook salmon and steelhead gamete cryopreservation efforts and cryopreseved semen fertilization trials.

OBJECTIVE 4. Determine the emigration timing of natural and hatchery reared chinook salmon smolts in the Imnaha River and estimate the post-release survival of hatchery reared chinook salmon smolts in the Imnaha River.

General

Mimicking the life history characteristics of the natural population into which hatchery fish are planted is an important aspect of a successful supplementation program. Failure to mimic the natural fish can result in depressing, rather than enhancing, the naturally spawning population (Chilcote et al. 1986, Nickelson et al. 1986). The information collected under this objective will provide several measures of post release performance of hatchery reared chinook salmon smolts and if they mimic the life history characteristics of naturally produced fish. This information may also provide further insight, and direct future research into the causes of downstream migrant mortality.

Subobjective 4.1: Determine the emigration timing of natural and hatchery reared spring and summer chinook salmon and estimate the post-release survival of hatchery reared chinook salmon smolts in the Imnaha River.

Approach:

The lower Imnaha River emigrant trap will be operated periodically during the fall emigration period and continuously during the spring emigration period (March 1 – June 15), to determine the time(s) of year at which fish migrate out of the Imnaha River; fish are assumed to enter the Snake River shortly after passing the lower trap. Post-release survival of hatchery reared chinook salmon smolts will be estimated through a 66 km stream reach from release at the chinook smolt acclimation facility (rkm 73) to the trap site at rkm 6.6. Post-release survival is estimated through use of passive integrated transponder (PIT) tagged smolts from the production release group at the Imnaha River chinook smolt acclimation facility, and applying the Survival Using Proportional Hazards (SURPH.2) model (Smith et al. 1994). Fish lengths and weights will also be collected to determine size and condition factors of emigrating fish. Weekly smolt trap catch information will be

shared with the Fish Passage Center to provide data from which to make fish passage flow and spill requests in the mainstem hydroelectric river corridor.

Task 4.1.1. - Install and remove the lower rotary screw trap as necessary.

Task 4.1.2. – Coordinate the initiation of remote monitoring of PIT tagged hatchery chinook salmon volitional release behavior from the Gumboot Acclimation Facility (includes installation and operations).

Task 4.1.3. - Conduct trap efficiencies trials for hatchery reared chinook salmon smolts (fin clips and PIT tags – 3,000 per year).

Task 4.1.4. – Sub-sample fish to collect length, weight, and condition (health/physiology) information.

Task 4.1.5. - Compare the emigration timing of hatchery reared and natural chinook salmon smolts.

Task 4.1.6. - Estimate the post-release survival of hatchery chinook salmon from the release point to the lower Imnaha River trap. The SURPH model, using PIT tag recoveries, and total estimated catch of hatchery chinook salmon will be used to estimate post-release survival in the Imnaha River.

Task 4.1.7. - Share weekly Imnaha River natural and hatchery summer chinook salmon and steelhead smolt emigration catch information with the Fish Passage Center.

Subobjective 4.2: Investigate the effect of water temperature and river discharge on emigration timing from the Imnaha River for natural and hatchery produced juvenile chinook salmon and steelhead.

Approach:

Monitor river stage and water temperature at the lower trap site. This information will be plotted against the number of natural and hatchery chinook salmon and steelhead that move past the lower trap.

Task 4.2.1. - Monitor USGS staff gauge information.

Task 4.2.3. - Monitor daily water temperature with a constant recording thermograph at the lower Imnaha River emigrant trap site. Download thermographs on a regularly scheduled basis.

Task 4.2.4. - Examine relationships between smolt emigration and stream temperature and river discharge.

OBJECTIVE 4.3: Determine and compare the migration timing, travel time, emigration survival, and smolt-to-adult survival of natural and hatchery reared chinook salmon and steelhead from the Imnaha River through the Snake River to Lower Granite Dam and to McNary Dam.

General:

The Imnaha River juvenile emigration monitoring will continue to assist in maintaining a time series of data that represent a variety of environmental conditions and hydro-operations. The results of this project will continue the collection of a time series of chinook salmon and steelhead smolt survival information to mainstem dams; as well as quantification of smolt-to-adult return rates (SAR's) of an index subpopulation of wild/natural chinook salmon in the Imnaha River. Both types of information would provide accurate performance measures. The performance measures may be used to monitor changes that occur in natal streams, in migration routes, and survival of Imnaha River adult chinook salmon. Determining and comparing hatchery reared and natural fish smolt performance variables such as travel time, arrival timing, and survival indices may provide insight into the effectiveness of hatchery programs. It may also direct future research into overcoming the causes of mortality which limit hatchery success. PIT tagging of natural and hatchery reared chinook salmon and steelhead smolts will allow Imnaha River smolts to be "visible" in the mainstem Snake and Columbia rivers migration corridor and allow salmon managers to make meaningful flow and spill management requests to maximize survival potential through the hydroelectric corridor.

There are several technical problems that prevent us from determining SARs at the mouth of the Imnaha River. Examples of these problems are as follows: the lack of year round trapping facilities to representatively sample and PIT tag adequate release groups, staff funding to conduct expanded sampling, and year round mainstem interrogation facilities to describe the diverse early life history migration patterns, juvenile passage routes and handling protocols at Snake River passage facilities. Our activities described here are designed to provide the cornerstones from which we can learn and build the foundation for the program to directly address the ultimate long-term status and performance measures for natural chinook salmon and steelhead.

Approach:

Natural chinook salmon and natural and hatchery steelhead will be PIT tagged throughout their emigration periods at the lower Imnaha River trap site. In order to capture an adequate number of fish for PIT tagging and survival estimation, we plan to operate two rotary screw traps in tandem. PIT tagging will occur to describe smolt performance characteristics, to calculate PIT tagged fish interrogation percentages at Snake River dams and to estimate survival of spring emigrating fish from the mouth of the Imnaha River to Snake River and Columbia River dams. The number of fish detected at Lower Granite Dam and other dams will be used to determine movement patterns and for comparison of natural and hatchery fish. Tasks 4.3.1 and 4.3.2 are to continue a collection of time series information on arrival timing, travel time and estimated survival analysis at the dams (Ashe et al. 1995, Blenden et al. 1996, Blenden et al. 1997, Blenden et al. 1998, Cleary et al. 2000) and to allow for estimation of survival of weekly PIT tag release groups. If possible, weekly PIT tag release group size would be 1,200 for natural chinook salmon smolts and 1,000 for natural steelhead smolts. Similar numbers of hatchery steelhead trout smolts will be tagged under a separate Fish Passage Center funded investigation which will allow comparison of smolt performance characteristics of those two groups.

In addition to estimating smolt performance characteristics and estimating smolt survival to the various Snake River dams we also propose to attempt to estimate the smolt to adult return rate (SAR) of spring emigrating natural chinook salmon smolts back to Lower Granite Dam. Survival will be estimated by the Cormack, Jolly, and Seber methodology, with the Survival Using Proportional Hazards (SURPH) program (Smith et al. 1994). The data files for release groups will be created using the program CAPTHIST (Westhagen and

Skalski 1997). Arrival timing, travel time, and survival result from the migratory behavior of the smolt and can be considered performance indices (Beckman et al. 1999). This data will be obtained by PIT tagging juvenile fish in the Imnaha River and retrieving mainstem dam interrogation data from PTAGIS. The tagging goal for natural chinook salmon is 20,000 with spring and fall tag allotments based on past estimates of fall and spring emigration (Kucera and Blenden 1998). PIT tag goals of 5,600 natural chinook salmon in the fall and 14,400 natural chinook salmon during the spring are necessary to maintain survival estimates to McNary Dam and to estimate SAR's of Imnaha River natural chinook salmon (Richard Townsend – University of Washington personal comm.). We desire a return of a minimum of 30 adults per brood year. With this approach 50% of interrogated Imnaha River natural chinook salmon will be recognized and bypassed directly back to the river (accomplished by PSMFC "separation by code" software). This allows us to represent a portion of the transported fish in the SAR estimate and contribute 7,560 to 10,000 natural chinook salmon to the Comparative Survival Studies (BPA # 8712702). Based on Lichatowich and Cramer (1979), a return of thirty adults will provide an 80% chance to detect a 4% to 53% change in a measured parameter with a 5% to 50% coefficient of variation over 8 to 10 years. Ideally, an adult PIT tag interrogation system would be installed in the Imnaha River, to provide tributary specific SAR information for natural and LSRCP produced hatchery chinook salmon.

PIT tagging goals for natural steelhead focus on maintaining a time series of smolt survival information through the Snake River hydroelectric system to McNary Dam (if possible). Tagging of 5,000 natural steelhead smolts should be sufficient for this purpose. Ideally, we would like to provide natural steelhead SAR information for the Imnaha River. Additional juvenile emigrant trapping facilities would be necessary to allow for representative sampling, abundance determination and PIT tagging adequate sample sizes.

Total PIT tags required is 25,000 if all mark groups are achieved. Uncertainty exists with the current trapping facilities and level of funding to achieve the desired sample size in all years. We are requesting 19,000 PIT tags annually and will plan on using carryover tags from the previous year to meet desired tagging levels.

Task 4.3.1. - PIT tag 20,000 emigrating natural chinook salmon during a index period of fall emigration and representatively across the entire spring emigration period.

Task 4.3.2. - PIT tag 5,000 emigrating natural steelhead representatively across the entire spring emigration period (emphasis given to spring smolts due to multiple age emigration behavior).

Task 4.3.3. - Estimate survival of natural and hatchery chinook salmon and steelhead smolts, through use of the SURPH.2 model, to Lower Granite Dam and through the Snake River to McNary Dam (if possible).

Task 4.3.4. - Interrogate previously PIT tagged and released hatchery chinook salmon smolts at the Imnaha River trap and use these fish as a release group to compare with natural chinook salmon smolts.

Task 4.3.5. - Determine the emigration timing, travel time and estimated survival of emigrating natural and hatchery chinook salmon and natural steelhead smolts from the Imnaha River to Lower Granite Dam and other Snake and Columbia River dams.

Task 4.3.6. - Statistically compare the variables under Task 4.1.6 for natural and hatchery steelhead smolts.

Task 4.3.7. - Coordinate with the appropriate agencies to collect PIT tag passage data for both juvenile and adult life stages at Lower Granite Dam and other Snake and Columbia River dams.

Task 4.3.8. - Determine smolt-to-adult survival rates from release to Lower Granite Dam for natural chinook salmon and steelhead PIT tagged in the lower Imnaha River.

OBJECTIVE 5. Determine adult steelhead abundance and spatial structure in the Imnaha River subbasin.

General

Snake River basin steelhead are currently listed as a threatened species under the ESA. Limited information is available on the status (escapement abundance, genetic structure, and life history traits) of steelhead in the Snake River basin, making development of conservation or management actions problematic. Ideally, baseline information on abundance, spatial structure, and diversity should be assessed in all spawning aggregates. Specifically related to the LSRCP, is a lack of data on the dispersion of adult hatchery reared steelhead into streams in the Imnaha River from the ongoing LSRCP steelhead supplementation effort in the Little Sheep Creek drainage. A more comprehensive study of adult steelhead escapement and genetic structure in the entire Imnaha River subbasin is needed.

Assessment of the total escapement of adult steelhead to the mouth of the Imnaha River with specific data on the metapopulation structure to specific spawning aggregates is desirable. Given the logistical constraints (spring run-off and large number of spawning aggregates) comprehensive monitoring of adult steelhead escapement and genetic stock structure is not feasible because of insufficient funding. Two alternative subsampling approaches can be applied: 1) selective sampling –where key/primary spawning aggregates throughout the subbasin are monitored; or 2) clumped sampling - where all spawning aggregates within a limited area of the subbasin are sampled. Each of these approaches provides critical information for understanding the metapopulation status and dynamics.

A report on the large-scale steelhead genetic stock structure throughout the entire Imnaha

and Grande Ronde River subbasins, without supporting demographic status information, is currently being finalized. Adult escapement (demographic) information and genetic profile information would be collected on three streams of close geographic proximity and similar habitat conditions in the Imnaha River subbasin. It is recommended that systematic sampling of the adult escapement in key metapopulation structure spawning aggregates be initiated. Currently, lack of funding prevents initiating this approach or a comprehensive adult escapement monitoring approach. Applying a selective sampling approach that monitors one or two additional key tributaries on a four year rotational basis would help obtain the demographic stock status information. Generating four years of population abundance estimates in a given tributary may take 5 or 6 years of sampling due to harsh environmental conditions and violation of estimator assumptions. Camp Creek will be persued as the most feasible (stream discharge and proximity to the Little Sheep Creek LSRCP facility) to address.

Approach:

Hydrology and engineering analysis of stream depth, stream velocity and stream discharge information has been collected during the spring of 1999 to 2001 in six tributaries of the Imnaha River. Based on this analysis, logistical consideration of field staffing (existing crew stationed at Thorn Creek Guard Station), and sampling approaches discussed above, the Tribal evaluation program will implement the clumped sampling strategy to enumerate adult steelhead spawner escapement in Cow Creek and Lightning Creek over a four year period (2001-2004; extended through 2005 due to violations of estimator assumptions in Lightning Creek during 2003 and in Cow Creek during 2004. Shifting monitoring activities to new tributaries in 2006 will be considered during the analysis of the 2005 data). Angled upstream and downstream weirs and fish traps will be installed to capture, enumerate and collect data from adult steelhead before release upstream/downstream of the fish counting station. The fish counting stations would be operated from January through June 1, or ten days after the last steelhead is captured. The trap would be checked daily for trapped fish and debris maintenance. Beside total escapement and spawner migration timing data, additional biological information would be collected from adult steelhead including fork length, sex, scales for ageing, examination for marks, tags, and fin clips to determine natural:hatchery composition, and collection of fin tissue for later DNA genetic characterization before release upstream of the trap. We propose to measure stream discharge at established transects on a weekly basis, and more frequently during freshet conditions to establish a discharge and staff gauge relationship. Constant recording thermographs would be installed to describe water temperatures in major tributaries of the Imnaha River subbasin. Adult steelhead spawner migration will be examined in relation to water temperature and stream discharge to describe relation between these variables. Activities would be coordinated with private land owners and appropriate salmon managers.

The use of picket weirs raises the concern for fish movement impedance. We have implemented a monitoring and evaluation approach for past weir operations that uses bank

observations to detect gross levels of impedance. Given the concerns of negative impacts to ESA listed stocks we are proposing a more intensive examination of the potential migration impedance using remote detection of fish movement via resistivity fish counting methods. The general approach would be the operation of a resistivity fish counting station in close proximity downstream of the existing weir in Lightning Creek or Cow Creek. Daily upstream and downstream fish movement from the resistivity counter will be compared to actual fish catch in the weir. Validation of the resistivity counter in Lightning Creek or Cow will continue in 2006, along with preliminary implementation in other streams (Camp Creek) in 2006.

Task 6.1. - Install the adult steelhead fish counting station in early January in Cow Creek and Lightning Creek and operate through June 1, or until ten days after the last adult is captured.

Task 6.2. - Operate the fish counting station on a daily basis to enumerate adult steelhead spawner migration and to remove debris from the structure. Release adult steelhead upstream of the counting station.

Task 6.3. - Collect biological information of fork length, sex, scales, general fish health, examine for marks/tags, scan with PIT tag and CWT scanners, and collect fin tissue sample for DNA analysis from all adult steelhead.

Task 6.4 – Install and operate resistivity fish counter in Lightning Creek and partially in Camp Creek.

Task 6.5. - Maintain constant recording thermographs in Cow Creek and Lightning Creek to describe existing water temperatures.

Task 6.6. - Determine the adult escapement, composition of natural and hatchery reared fish and sex ratio (if possible) of the steelhead run in Cow Creek and Lightning Creek.

Task 6.7. - Describe the adult steelhead spawner migration timing in relation to water temperature and stream discharge.

Task 6.8. - Prepare annual reports summarizing adult steelhead escapement monitoring activities.

Task 6.9. – Continue to coordinate the development of juvenile steelhead emigration trapping equipment and study design for the Little Sheep Creek Facility with ODFW.

Task 6.10. – Coordinate the implementation of 2006 systematic adult steelhead escapement sampling in Camp Creek and other key tributaries in the Imnaha River subbasin.

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Attachment B

Nez Perce Tribe Department of Fisheries Resources Management
Monitoring and Evaluation Plan for the Adult Steelhead Weir Operation

Assessment of the adult steelhead return to Imnaha River tributaries is desired to examine the numbers of returning adults, straying of hatchery adults from the Little Sheep Creek supplementation program, timing and stream queues of the wild and hatchery spawning run, residency time of adults in the stream and the genetic profile of these adults. Operation of an adult weir is planned to examine these characteristics. The current critical status of steelhead runs in the Snake River drainage makes an increased understanding of and establishment of the status of the Imnaha River tributary steelhead spawning aggregates desirable. However, it is of the utmost importance that our research activities not significantly impact and jeopardize the integrity of these wild A-run steelhead.

In an attempt to minimize the potential negative impacts that our research activities could have the following operation and monitoring and evaluation plan is utilized. Hevlin and Rainey's (1993) paper on *considerations in the use of adult fish barriers and traps in tributaries to achieve management objectives* was used as a guide to possible impact considerations.

Desired Data

1) Genetic profile of returning adults

2) Number of adults returning to spawn.

3) Contribution of hatchery steelhead to spawning aggregates.

4) Biological characteristics of returning adults including: fork length, age, migration timing, and stream residency time.

Data Collection Methods

A temporary river-wide picket (diffuser) weir with an upstream and downstream holding/collection box will be the fish collection device and will be checked twice a day. Steelhead in the upstream movement box will dipped out with cotton dip net and place into a moist canvas sling/measuring box. Data including fin clips, sex, spawning condition (pre/post and percent), and fork length will be recorded. Scales will be collected from just behind the dorsal fin and above the lateral line using a blunt knife and forceps. A double left opercular punch will be given using a paper hole punch and a tyvek disk tag will be applied to the right operculum. Non-target species will be measured (sub-sample 25/day/species) and released. Steelhead and non-target species will be release into a pool/slack water above the weir.

Steelhead captured in the downstream movement box will be examined for an opercular punch. Marked fish will be checked spawning condition recorded and released downstream.

Downstream moving non-marked steelhead and non-target species will be handled with the same procedures as upstream moving fish with the exception of a downstream release.

Debris will be cleaned off pickets at least twice a day.

Primary Concerns

1) Steelhead mortality associated with trap design and handling procedures.

2) Blockage/impediment of upstream movement of steelhead and other migratory species (for example: suckers).

3) Weir integrity: ability to withstand high water and not compromise streambed structure (erosion and flooding).

Monitoring and Evaluation Options

Primary Concern 1)

- Build holding boxes with minimal opportunities for injury, i.e. simulated cover and current break and large enough to accommodate lots of fish. Monitor downstream movement box and pickets for handling mortality (pre-spawned).

Primary Concern 2)

- Visual observation from bank = Walk stream from 200 meters below the weir to the weir recording the number, location, and any spawning activity of adult steelhead observed. The effectiveness of this procedure will be limited by water clarity and broken water surface cover. Repeated observations of fish and no corresponding capture in weir will signal migration impediment.

- Resistivity weir/video weir -represents the only method to confidently assess the presence of adult steelhead and other fish species below weir, especially in turbid water conditions. This method will give us the ability to quantify impedence an presence of other non-steelhead fishes.

Primary Concern 3)

- Site review and weir design analysis has been completed by subcontracted hydrologist/engineer. Closely monitor debris load and clean the weir as necessary.

Proposed Monitoring and Evaluation Procedures

- Visual observations from bank daily for 200 meters below and above weir.

- Bi-daily observation and 24-hour observation during peak flow periods. Water levels reaching approximately 1.2 meters from stream bottom will represent the maximum level for safe access to weir pickets and trap box.

- Observe for trapping and handling mortalities. All mortalities will be examined to determine primary cause of death with immediate modification of trap and handling procedures as need.

Installation, Operation, and Removal Protocol

Weir design will include a V-shape formations on both the upstream and downstream sides to guide fish to separate holding boxes measuring four feet by six feet. Holding boxes will be placed in the thalwag and include a top to provide cover.

Repeated bank observations of more than 10 adult steelhead with no corresponding capture in weir will signal migration impediment and weir modification or removal will be initiated.

Access to weir pickets for cleaning and removal can be accomplished by wading during medium to low flows. During high flow periods access will be possible via a 2" x 12" catwalk attached to the back side of the tripods. Life Jackets must be used during medium and high flow periods.

Adult Steelhead Weir Daily Check List

1. Place blocking picket in trap box entrances.
2. Clean debris off weir and place downstream of weir.
3. Check all weir pickets for proper placement on bottom. Use a downward twisting motion. Note any holes found.
4. Record staff gauge reading and water temperature.
5. Check trap boxes for fish.
6. Remove one steelhead at a time.
7. Place steelhead belly up in measuring box.
8. Record Fork Length.
9. Record Fin Clips and check for Recapture Opercular Marks.
10. Determine Sex and Spawning Condition (Pre or Post).
11. Take Scale Sample (5 or more scales).
12. Apply two left opercular punches and keep for genetic samples.
13. Apply tyvek disk tag to right operculum.
14. Release all steelhead in slack water above the weir.
15. Repeat steps 6 through 13 until all steelhead are removed from trap box.
16. Remove all other species from trap box and record length from 25 fish of each species daily.
17. Release in slack water above weir.
18. Remove blocking picket from trap box entrance.